Collaborative Information Portal (CIP)

NASA developed the Collaborative Information Portal (CIP) to provide missions with "one-stop access" to vast amounts of real- and near-time information arriving both from space and earth-based sources in a simple, distributed and intuitive way. Using commonly available computers and operating systems, CIP provides users with situational awareness, rapid data access, and support for time-critical operational science and engineering processes. This low cost-per-seat system enables current and future missions to meet and exceed their information management, collaboration, and work-flow management processes, enabling increased science return, management oversight and reduced risk.

Background

The Collaborative information Portal (CIP) was developed to address the data access, time management, and work-flow requirements of the Mars Exploration Rover (MER) Project's Surface Operations Phase. CIP was deployed at the NASA Jet Propulsion Laboratory (JPL) as a sub-system of the MER Ground Data System (GDS) and is being used in a "class-A" operational role by the mission. CIP has been supporting MER since the summer of 2003 when operational readiness tests began.

The CIP architecture (software and hardware) leveraged:
• Heterogeneous data access and advanced data management technologies of the DARWIN Information System for Aeronautics [1]
• Secure Web-services and communications protocols [2]
• Feature rich, interactive client applications implemented in Java [3].

CIP is portable, distributed and flexible, allowing users to retrieve the information they need from a variety of computers and locations. The implementation enables the MER operations teams to access the CIP system from wired or wireless laptop computers, mission control desktop systems and workstations, staff offices, meeting rooms, and even from home. Flight directors use CIP to manage communications schedules and time on large projections screens and workstations, while mission managers use CIP to manage work-flow, access data and communicate changes and directions to the team. Science and engineering teams use CIP to announce data availability, monitor staffing and meeting schedules, follow work-flow, and to access data. CIP enables true portability for these users, while maintaining constant and current access to relevant mission information, change notification, and real-time communication with the team. CIP is currently used by over 360 registered flight operations users.
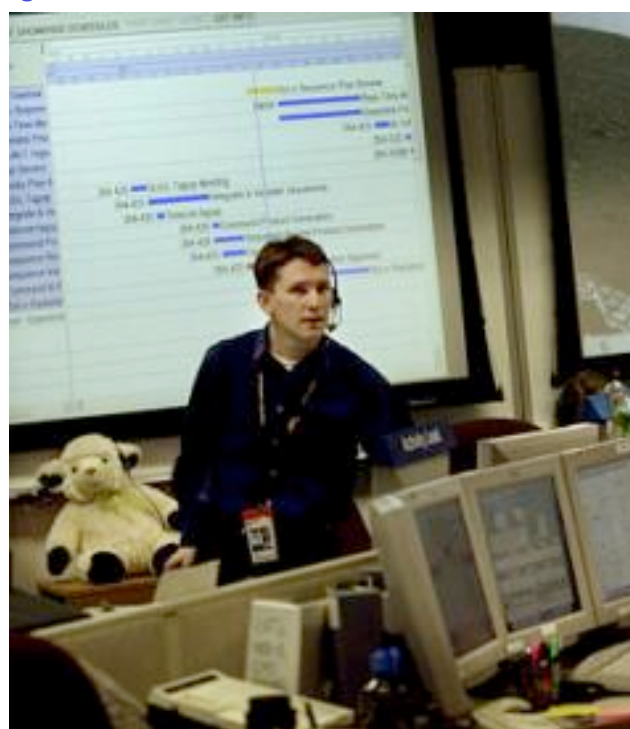
Research Overview

The CIP system addresses the information management needs of current and future robotic and human exploration missions. These missions require rapid and accurate access to large volumes of data with a high degree of interactivity. The system must support portability and a decision-making capability both on earth and in remote locations like space and the surfaces of other planets and moons. The system must have a reasonable deployment and operating cost and allow for extension and scalability. The user interface must support critical mission tasks and be customizable to meet the needs of individuals. In an operational role, the system must provide for high reliability, security and data integrity.

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To meet these requirements, the CIP research teams, developers and collaborators focus on several key areas including:

- Advanced data management: data abstraction, semantic information organization and distributed heterogeneous, synchronized and non-synchronized data repositories enforcing data currency and integrity.
- Human centered interfaces: design and development of interfaces facilitating data understanding, situational awareness and enabling user specific support and customization.
- Change awareness strategies: system and user notification of data and information changes and context updates.
- Work flow and time management: seamless integration of temporal and hierarchical data and information into a consistent user environment.
- System and software portability: multi-platform and operating system support for distributed operations environments while maintaining real-time interactivity, data accuracy, currency, and collaboration.
- Communications security and integrity: Network and security implementation, data and user management, latency and network loss amelioration strategies.
- Software Architectures: modularity, reusability, middleware and interfaces.
- Scalability and cost containment: system deployment strategies for optimum security, speed, user support, upgradeability and overall cost.

CIP leverages ongoing research and collaboration with local and external research organizations in all these areas to ensure the best balance of technology, cost, performance, user satisfaction, information accuracy, system reliability, and tool utility.

Relevance to Exploration Systems

Future robotic and human exploration missions will require access to much greater amounts of real- and near-time information with the decision making taking place both on earth and remotely (in space and the surfaces of other planets and moons). A reasonable-cost, feature rich, real-time information management and access capability is essential to maintaining the command, control and information quality necessary to enable such distribution of decisions with reduced risk and increased mission return. CIP technologies and its future incarnations will be ready to meet the needs of these future missions.

H&RT Program Elements:

This research capability supports the following H&RT program /elements:

ASTP/Software, Intelligent Systems & Modeling

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http://ic.arc.nasa.gov/story.php?sid=61&sec=earth

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